THE STUDY OF RISK FACTORS THAT LEAD TO ROAD ACCIDENTS AMONG STUDENTS IN HEALTH CAMPUS UNIVERSITI SAINS MALAYSIA

by

NUR AINN BINTI ZULADZHAR

Dissertation submitted in partial fulfillment of the requirements for the degree of Bachelor of Health Science (Honours) (Environmental and Occupational Health)

June 2016

ACKNOWLEDGEMENT

Praise to Allah, I finally completed my final year project. I would like to extend my sincere appreciation and gratitude to many people who helped me to make this possible.

I would like to express my deepest gratitude to my supervisor, Mr Mohd Nasrom bin Mohd Nawi, for his generous advice, kind assistance and patiently guidance. Thank you for all your time and valuable experience that have shared with me regarding this study.

Secondly, I want to give my appreciation towards all the respondents from Universiti Sains Malaysia Health Campus, who generously spent their precious time to participate in the questionnaire survey of this study.

I also want to thank my entire friends who directly or indirectly assisted me in this project study. Last but not least, a special thanks goes to my loving mother, Azizan binti Zakaria and my caring father, Zuladzhar bin Kamarudin and also towards my siblings for care, moral support and understanding during four years of studying in Universiti Sains Malaysia.

KAJIAN KE ATAS FAKTOR RISIKO YANG MENYEBABKAN KEMALANGAN JALAN RAYA DALAM KALANGAN PELAJAR DI KAMPUS KESIHATAN, UNIVERSITI SAINS MALAYSIA

ABSTRAK

Kadar kemalangan jalan raya berada pada tahap yang makin membimbangkan. Kajian ini dijalankan dengan tujuan untuk mengkaji faktor risiko yang menyebabkan kemalangan dalam kalangan pelajar di Kampus Kesihatan Universiti Sains Malaysia. Objektif kajian ini adalah untuk mengkaji perkaitan di antara jantina, sikap dan tingkah laku dengan kemalangan jalan raya. Kajian dilakukan terhadap 162 orang pelajar Pusat Pengajian Sains Kesihatan di Universiti Sains Malaysia. Instrumen yang digunakan dalam kajian ini ialah Borang Kaji Selidik. Borang Soal Selidik terdiri dari bahagian A (data demogrfi), bahagian B (tingkah laku) dan bahagian C (sikap). Kaedah Khi kuasa dua dan ujian Korelasi Spearman digunakan untuk menjawab objektif kajian. Hasil kajian ini menunjukkan bahawa tidak terdapat hubungan yang signifikasi antara jantina ($p= 0.217$), sikap ($p= 0.143$) dan tingkah laku ($p= 0.833$) dengan kemalangan jalanraya. Secara keseluruhnnya, faktor risiko kemalangan jalan raya yang dikaji dalam kalangan pelajar di Kampus Kesihatan Universiti Sains Malaysia tidak menjadi penyumbang kepada kemalangan jalan raya.

Kata kunci: Tingkah laku, Sikap, Kemalangan jalan raya

THE STUDY OF RISK FACTORS THAT LEAD TO ROAD ACCIDENTS AMONG STUDENTS IN HEALTH CAMPUS OF UNIVERSITI SAINS MALAYSIA

ABSTRACT

The rate of road accidents are increasingly worried. The aim of this research was to study the risk factors that can lead to road accidents among students in Health Campus Universiti Sains Malaysia. The specific objectives for this study were to determine the relationship between gender, attitude and behavior with road accidents. The study was conducted among 162 students at School of Health Sciences Universiti Sains Malaysia. The instrument used in this research to fulfill the objectives of the study was Questionnaire form. The Questionnaire consists of section A (demographic data), section B (behavior) and section C (attitude). A Chi Square test and Spearman's Correlation test were used to answer the objectives of the study. The finding showed that there were no significant relationship between gender ($p= 0.217$), attitude ($p= 0.143$) and behavior ($p= 0.838$) with road accidents. Overall, the risk factors of road accidents among students in Health Campus Universiti Sains Malaysia does not lead to road accidents.

Keywords: Behavior, Attitude, Road accidents

TABLE OF CONTENTS

	Pages
ACKNOWLEDGEMENT	**Iv**
ABSTRAK	**v**
ABSTRACT	**vi**
TABLE OF CONTENTS	**vii**
LIST OF TABLES	**x**
LIST OF FIGURES	**xi**
LIST OF APPENDICES	**xii**
LIST OF ABBREVIATIONS	**xiii**
CHAPTER 1: INTRODUCTION	
1.1 Background Study	1
1.2 Research Objectives	3
1.2.1 General Objectives	3
1.2.2 Specific Objectives	3
1.3 Research Question	3
1.4 Research Hypothesis	3
1.5 Variable Definition	4
1.6 Significance of Study	4
1.7 Problem Statement	5

CHAPTER 2: LITERATURE REVIEW

2.1 Increasing of Road traffic Accidents 7

2.2 Lack of Awareness as a Cause of Car Crash 8

2.3 Gender 9

2.4 Behavior of Road Users 10

2.5 Attitude of Drivers 11

2.6 Speeding Drivers 11

2.7 Awareness and Practice of Road Safety 12

2.8 Pattern of Road Traffic Accidents 15

2.9 Increasing Vehicles cause Road Accidents 15

2.10 High Risk Group 17

2.11 Impact of Road Traffic Accidents on Elderly 18

2.12 Road Accidents Prevention 20

CHAPTER 3: METHODOLOGY

3.1 Study Design 21

3.2 Study Location 22

3.3 Population of Study 22

3.4 Sample Collection 23

3.5 Instrument and Materials 24

3.6 Ethical Consideration 25

3.7 Reliability and Validity 26

3.8 Data Collection 27

3.9 Data Analysis 28

3.10 Flow Chart of the Research 29

CHAPTER 4: RESULTS

4.1 Normality Test Results 31

4.2 Demographic Data of Respondents 31

4.3 Distribution of Behavior and Attiude of Respondents 33

4.4 Risk Factors that Lead to Road Accidents 37

4.4.1 Relationship between Gender and Road Accidents 37

4.4.2 Relationship between Attitude and Road Accidents 38

4.4.3 Relationship between Behavior and Road Accidents 39

CHAPTER 5: DISCUSSION

5.1 Relationship between Gender and Road Accidents 40

5.2 Relationship between Attitude and Road Accidents 41

5.3 Relationship between Behavior and Road Accidents 43

CHAPTER 6: CONCLUSION AND RECOMMENDATION

6.1 Conclusion 46

6.2 Recommendation 46

6.3 Future Research Suggestion 48

6.4 Limitation of the Study 49

REFERENCES 50

APPENDICES 57

LIST OF TABLES

Table		Pages
4.1	Normality Test for Attitude	31
4.2	Normality Test for Behavior	31
4.3	Demographic Data of Respondents	32
4.4	Distribution of Attitude of Respondents	33
4.5	Distribution of Behavior of Respondents	35
4.6	Chi Square Analysis for the Relationship between Gender and Road Accident	37
4.7	Spearman Correlation Analysis for relationship between Attitude and Road Accidents.	38
4.8	Spearman Correlation Analysis for relationship between Behavior and Road Accidents.	39

LIST OF FIGURES

Figures		Pages
2.1	Countries with most Vehicle per Person	16
3.1	Krejcie and Morgan's Sample Size Table	23
3.2	Flowchart of Research	30

LIST OF APPENDICES

Appendix

A	Questionnaires Form
B	Information Consent Letter
C	Letter of Approval from School of Health Sciences
D	Letter of Approval from Human Research Ethics Committee Universiti Sains Malaysia
E	Publication

LIST OF ABBREVIATIONS

DBQ	Driver Behavior Questionnaire
JEPeM	Jawatankuasa Etika Penyelidikan dan Manusia
MAIDS	Motocycle Accidents In-Depth Study
MROADS	Malaysian Institute of Road Safety Research Database System
MUARC	Monash University Accident Research Centre
NCRB	National Crime Records Bureau
OECD	Organisation for Economic Co-operation and Development
PDRM	Polis Diraja Malaysia
PPSG	Pusat Pengajian Sains Pergigian
PPSK	Pusat Pengajian Sains Kesihatan
PPSP	Pusat Pengajian Sains Perubatan
RTA	Road Traffic Accident
RTI	Road Traffic Injury
SPSS	Social Package for the Social Science
UK	United Kingdom
US	United State
USM	Universiti Sains Malaysia
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background study

A road accident refers to any accident involving at least one road vehicle, occurring on a road open to public circulation, and caused at least one person is injured or killed. However, intentional acts such as murder or suicide and natural disasters are excluded from the definition of road accidents (National Institute of Statistics and Economic Studies, 2016).

Undoubtedly, road accidents are the most frequent and overall, the cause of the most damage. Extremely dense road traffic and the relatively great freedom of movement given to drivers are among the reasons of road accidents. Accidents which involving heavy goods vehicles for example coaches and lorries with trailers occur all too frequently despite calls for responsible behavior, for respect of the loading regulations and the highway code, as well as the obligation for drivers to adapt their speed, which will affects stopping distances, to the traffic and weather conditions such as rain, ice and fog. The prevention of road accidents is also extremely important and will be ensured by strict laws, by technical and police controls, ongoing training for drivers especially for those involved in the transport of dangerous substances and if need be, by legal and administrative penalties for those responsible (International Civil Defence Organisation, 2016).

By combining the data of 128 countries, The World Health Organisation (WHO) estimated the number of deaths on the road are at 1.24 million. In 2010, 50 percent of fatal accidents involved a vulnerable road user which were 22 percent pedestrians, 5 percent cyclist and 23 percent motorised two or three-wheelers.

According to WHO (2013), Europe shows a similar trend with 43 percent of fatal accidents involving pedestrian, a cyclist or a motocyclist. Passenger cars are the vehicles that are most frequently involved in collisions with motorcyles which was 60 percent of the accidents recorded between 1999 to 2001 in France, Italy, Germany, Netherlands and Spain. It is found that the main cause of motorcycle collision was human error (Motocycle Accidents In-Depth Study (MAIDS), 2005).

Monash University Accident Research Centre (MUARC) found intoxicated drivers caused 13.5 percent of crashes, drivers falling asleep resulted in 11.8 percent of crashes while 3.2 percent of crashes were caused by interaction of passenger. The MUARC also state that the most common subtypes of inattention were restricted attention, primarily due to intoxication and/or fatigue and diverted attention or distraction. The most common types of distraction involved voluntary, non-driving related distractions originating within the vehicle such as passenger interactions (Beanland *et al.*, 2013).

This study will focus on the risk factors that effect the drivers while driving which are gender, attitude and behavior. This study will be conducted at Health Campus, Universiti Sains Malaysia and focussed on undergraduate students.

1.2 Research Objectives

1.2.1 General objectives

a) To determine the risk factors that lead to road accidents among students in Health Campus Universiti Sains Malaysia.

1.2.2 Specific Objectives

a) To determine the relationship between gender and the road accidents.

b) To determine the relationship between attitude and the road accidents.

c) To determine the relationship between behavior of drivers and road accidents.

1.3 Research Questions

a) What is the relationship between gender and the road accidents?

b) What is the relationship between attitude and road accidents?

c) What is the relationship between behavior of drivers and road accidents?

1.4 Hypothesis

H_A :There is a significant association between gender and road accidents.

H_A: There is a significant association between attitude and road accidents.

H_A: There is a significant association between behavior and road accidents.

1.5 Variable Definition

a) Attitude: A settled way of thinking or feeling about someone or something, typically one that is reflected in a person's behavior.

b) Behavior: The way in which one acts or conducts oneself, especially toward others.

c) Road accidents: Road traffic accident occurs when a vehicle that is moving along a roadway collides with another vehicle or object.

1.6 Significance of Study

This study was concerned because it involves the safety of individuals especially road users. This study not only gave benefits to researchers and students but also to the drivers outside. The purpose of this study was to identify the risk factor that lead to road accidents in order to get a better understanding regarding safety issues when driving. The results obtained from this study can determine the current attitude and behavior among students while on the road. If their attitude and behavior on road is not as expected, then the management of the campus can plan measures for the students such as fine and penalty for students againts the rules and thus this will help to improve the current safety awareness among them and help them to more alert while on the road in the campus. Besides that, the outcome of the study can be used by the police and the department of road transport for enforcement rules on the road. The results of this study can also be used by those who want to improve their safety programs to overcome the tragedy of road accidents.

Study on risk factors that lead to road accidents is very crucial and important because the road accidents occurs daily in this country. We are always in the know of road accidents. By conducting this study, it is hoped that the road accidents-related studies will increase in Malaysia and thus will help the other researchers to get information on the road accidents in Malaysia. The results and the findings may contribute to the additional literature and it also will be useful as knowledge for the future improvement and development for study in the area of road accidents.

1.7 Problem Statement

Millions of road users are killed or injured in traffic accidents every year (WHO, 2004). In 1990, Road-traffic accidents (RTA) were ranked as the ninth most common cause of death. By 2020, it was estimated to be the third most common cause of death (Murray *et al.*, 2000). Besides that, fatalities are expected to increase by over 80 percent in developing countries and by 65 percent including the developed countries by 2020 (Kopits, 2004).

In Malaysia, traffic accidents have been increasing at an average rate of 9.01 percent every year from 1974 to 2010 (Royal Police Malaysia (PDRM), 2011). Over 20 fatalities per 100,000 people in 2020 was estimated in Malaysia (Kopits, 2004).

In 2010, 241 people were killed in crashes which are involving someone exceeding the speed limit and a further 180 people died when someone was travelling too fast. Drivers and riders who are travelling at inappropriate speeds exposed to a higher risk to crash. The higher speed will results more severe injuries, to themselves and/or to other road

users of crash. Inappropriate speed also caused by other driver errors, such as driving too close or driving when tired or distracted, multiplying the chances of these types of driving causing an accident (The Royal Society For The Prevention Of Accidents, 2011).

CHAPTER 2

LITERATURE REVIEW

2.1 Increasing of Road Traffic Accidents

The leading cause of death by injury was TRA and the tenth that leading cause of all deaths globally. Every year, 1.2 million people are killed in road crashes, and as many as 50 million are injured which occupying developing countries hospitals with 30 percent to 70 percent of orthopedic beds. It is predicted that RTA to be the third leading contributor to the global burden of disease and injury by 2020 if the current trends continue (Mohan, 2002).

In developing countries, driver impairment is an important component of road traffic accidents. Major factors in crashes, deaths, and serious injuries including driving at excess speeds, while under the influence of alcohol or drugs, while sleepy or tired, when visibility is compromised, or without protective gear for all vehicle occupants (Worley, 2006).

People ages 15 to 44 contribute to more than one-half of all road traffic deaths globally at their most productive earning years. Besides that, disability-adjusted life years lost because of road traffic accidents for this age group accounts for 60 percent. The costs and impacts of these losses are significant. Three-quarters of all poor families who lost a member to road traffic death reported a decrease in their standard of living while 61 percent said they had to borrow money to cover expenses due to their loss. The World Bank estimates, the gross national product of developing countries cost 1 percent to 2

percent of road traffic injuries, or twice the total amount of development aid received worldwide by developing countries (Peden and Hyder, 2002).

2.2 Lack of Awareness as a Cause of Car Crash

The lack of awareness or knowledge about the extent of the human and economic losses because of road crashes are usually arising from the lack of public concern. Awareness or knowledge are considered as important to generate the action needed to increase the level of awareness about road safety among Canadian public (Transport Canada, 2006). Singhal *et al.* (2006) stated that based on prevalent belief in road safety community, if public awareness were increases, the level of concern are also will increase. This scenario will mobilize political action, together with producing other benefits for example changes in safe driving practices and as a result reduce the road crashes.

Public is relatively did not concern regarding the road crashes problem and this is because of lack of knowledge about the incident. There is a belief that the public underestimate the importance of the problem. However they overestimate its seriousness both in absolute terms and relative to other health and safety causes of mortality. If the assumptions which is awareness is linked to concern is correct, then it is necessary for the public to concern about the problem of road crash.

Levels of concern of Canadians regarding road safety are at the same level as health care system and pollution. Canadians were asked to rate the issues they concerned. From the result obtained, road safety is seen to be more important social issue than the pollution.

Level of concern for road safety and support for greater enforcement of limits was related to each other. Canadians who were concerned about road safety agreed with the need for greater enforcement while those who did not concern did not agreed. Besides that, there was also an association between concern for road safety and the need for more police spot checks to catch drinking drivers and the requirements for all drivers involved in crashes to be tested for drugs. Drives who are concerned about road safety agreed to spot checks by police and the requirements to impound the vehicles of drivers who fail a breath test for alcohol.

2.3 Gender

The overall knowledge of road safety measures was higher among females compared to males (Kulkarni *et al.*, 2012). Males have a higher levels of knowledge (Raj *et al.*, 2011). The difference in awareness according to gender might be attributed to the study settings. Swami *et al.* (2006), in his study mainly included urban population while the Raj *et al.* (2013) in his study mainly included participants from rural background. Day-to-day exposure to traffic in cities and better exposure to media sources might be the reasons for the better performance of females.

Unfortunately, when sub-topic exploration is done, the participants significantly lacked knowledge regarding the certain important risk factors while driving. Dangers of driving only being aware by a few students. Besides that, knowledge in relation the use of seat belts was low among the participants.

In Bhubaneswar, both male and female of the age 21 to 24 years involved in accidents, while in the Assam study, it is 15 to 44 years. In this specific group, some of the particular high-risk behaviours such as alcohol consumption, driving in high speed and etc., were common. All national reports and independent studies conclusively point out that men are killed and injured in greater numbers compared to female with male to female ratios varying from 4:1 to 5:1 (Kar *et al.*, 2015).

According to the National Crime Records Bureau (NCRB) (2005), the age group of 15 to 44 years contribute to 64.3 percent of death with children and the elderly accounting for 6.4 percent and 8.2 percent of deaths respectively. Adult males are commonly involved in RTAs as is also cited in studies by Jha *et al.* (2003) and Patil *et al.* (2008).

2.4 Behaviors of Road Users

Behavior of road users is the reasons of road crashes which is known to contribute for more than 60 percent of the accidents. Effective road safety communication campaigns is one possible intervention to improve the road users behavior. Delhomme (2009) said that the purpose of road safety communication campaign is to inform, persuade and motivate population or sub-group of a population to change its attitude and behavior to improve road safety by using an organised communication involving specific media channels within a given time period.

Other activities such as enforcement, education, legislation, personal commitment and rewards usually supplemented the campaign. Organisation for Economic Co-operation and Development (OECD) (2006) suggested that road safety campaign is one of the

possible interventions to improve performance level in countries with lower performance, especially when combined with intervention for examples seatbelt wearing, drinking driving, speeding and reducing young risk driver.

From 2011 to 2020, year of 2015 marks the mid-point of the United Nations Decade of Action for Road Safety. In order to save 5 million lives on the world's roads by the end of the decade, much has already been written about the challenges facing by our global community (WHO, 2011).

2.5 Attitude of Drivers

In general terms, 82 percent of the drivers think that driving too fast is one of the factors that contribute to more traffic accidents. Besides that, they consider that the other drivers are the ones that exceed the speed limits. Other than that, they consider they seldom speed and at the same time, they state that these limits are only indicative, which is clearly linked with the non-compliance of these limits. The combination of these factors caused the traffic violation rates related to speed are between 50 percent and more than 75 percent (Feuillet and Egido, 2016).

2.6 Speeding Drivers

According to The Royal Society for The Prevention of Accidents (2011), higher speed indicates that the drivers have less time to determine and response to the situation around them and thus it takes longer for the vehicle to stop. This situations cause the drivers' safety to margin and turns near misses into crashes.

Around two-thirds of crashes in which cause killed or injured occur on roads with a speed limit of 30 mph (48.28 km/h) or less. At 30 mph (48.28 km/h) vehicles are moving at 44 feet or about 3 car length per second. One blink and the driver may fail to see the early warning of brake lights, a short glance away and the movement of a child behind a parked car will be leave unnoticed. Even in good conditions, the difference in stopping distance between 30 mph (48.28 km/h) and 35 mph (56.33 km/h) is an extra 21 feet or more than 2 car lengths (The Royal Society for The Prevention of Accidents, 2011).

The accidents would fall to 5 percent if the average speeds are reduced by 1 mph (1.61 km/h). However, this condition varies slightly according to road type, so that a 1 mph reduction in average speed would reduce accident frequency by about 6 percent on urban main roads and residential roads with low average speeds, 4 percent on medium speed urban roads and lower speed rural main roads and 3 percent on the higher speed urban roads and rural single carriageway main roads. The drivers are more likely to be involved in an accident if they drive more than 10 to 15 percent above the average speed of the traffic around them. Other than that, drivers who are speed more likely to involved in collision and commit other driving violations for example red-light running and driving too close (The Royal Society for The Prevention of Accidents, 2011).

2.7 Awareness and Practice of Road Safety

73 percent of Road Traffic Accident (RTA) burden accounted for India alone (WHO, 2009). According to a report published by Ministry of Road Transport and Highways,

every hour 56 accidents occur on Indian roads and at least 14 people are killed in these accidents (Ministry of Road Transport and Highways (Government of India), 2011).

It is very crucial to prevent RTAs in order to improve the longevity and the quality of life of the individuals concerned. The problem status of road traffic fatalities in this part of the country have been highlighted in a few studies from the region (Kumar *et al.*, 2006., Jain *et al.*, 2009., Kanchan *et al.*, 2010., Kanchan *et al.*, In Press). The impact of RTAs on the people's lives can be reduced effectively by simple measures such as awareness and practice of road safety measures.

The same observations are made in other studies from Malaysia and Aseer region (Redhwan and Karim, 2010., Al-Khaldi, 2006). The most cost effective way to prevent RTA related morbidity and mortality is the use of seatbelts (Green, 1994, Evans, 1996). Poor knowledge of the participants regarding the use of seatbelts raises concern and should be addressed through proper awareness generation programs.

Besides that, the knowledge in relation the safe use of mobile phones while driving on roads are also appeared to be low among the study participants. A well known risk factor for RTA related fatalities is the use of mobile phones without hands free devices (Violanti, 1998., Lamble *et al.*, 1999).

Efforts are on to increase the awareness on safe use of mobile phones through signboards urging road users to not use mobile while driving in this part of the country. Awareness related to the traffic signs is better than the awareness of road safety measures which is still less than the expected satisfactory levels. Day to day exposure to

these signboard while travelling increased the knowledge of traffic signs among study participants. Findings from the study found that 1/4th of study participants were drunk while driving and 1/5th of participants used mobile phones without hands free while driving and almost 2/3th participants exceeded speed limits while driving (Gharaibeh and Abu Abdo, 2011). The used of mobile and over-speeding while driving are dangerous to other road users, not only to the driver.

This kind of behavior need to be addressed through proper educative measures and legislation. It was found that almost half of participants followed traffic rules while more than 2/3rd serviced their vehicles regularly. Among the factors which lead to increase of road traffic accidents was old and badly maintained vehicles in developing countries like India (Odero *et al.*, 1997). To reduce the morbidity aand mortality realated to road traffic accidents, practices relating to road safety is necessary.

Proper road safety measures are the best available interventions to control the road accidents. Awareness and practice of road safety measures was low undergraduate medical students in South Indian State. Periodic trainings among medical students should be done to create awareness generation and orientation towards road safety issues. To reduce the morbidity and mortality regarding the road traffic accidents, road safety measures through signboards, posters and mass media should be strengthened (Kulkarni *et al.*, 2013).

2.8 Pattern of Road Traffic Accidents

The motor vehicle population is growing at a rate faster than the economic and population growth in India. Road Traffic Injuries (RTI) ranked as sixth leading cause of death in India with a greater share of hospitalization, deaths, disabilities, and socioeconomic losses especially in the young and middle-aged population (WHO, 2011). The problem in India is not really concerned because it is masked by the benefits of globalization and currently appears as a bigger priority to policy makers.

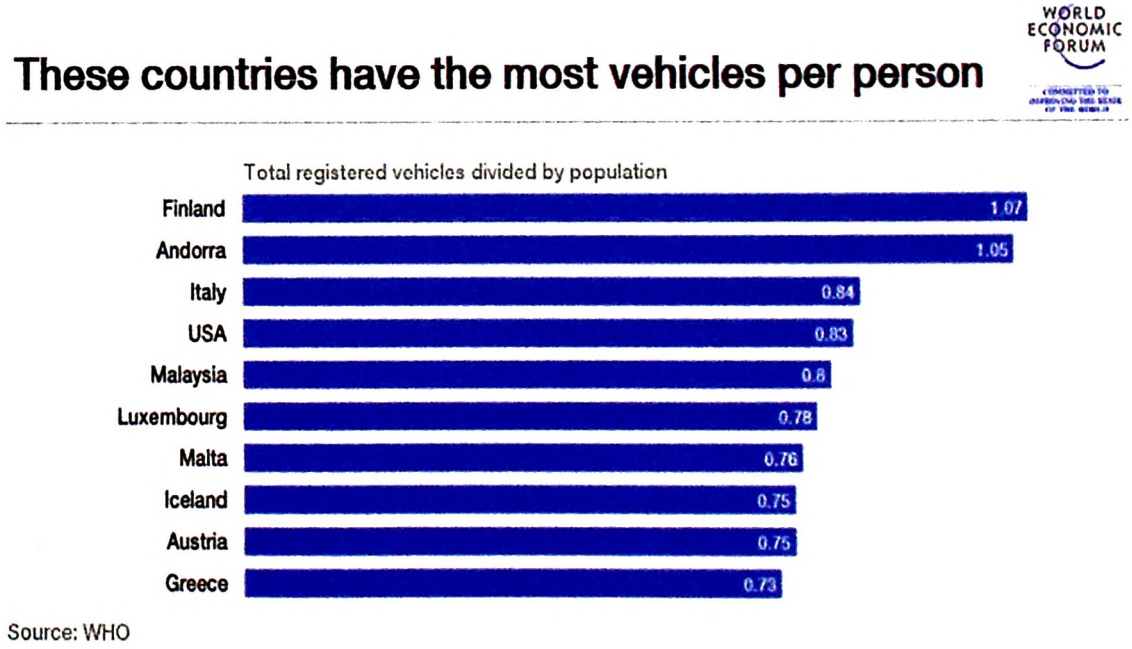
However, along with the economic development in which most of the middle-level cities are now becoming big commercial hubs and the big cities are achieving astronomical proportions, enforcement of laws and regulations for community safety, do capacity-building of police and traffic department as well as plan the city well are gradually forgot. It is also necessary to ensure a robust health system that can manage the road traffic emergencies, if at all they happen in the absence of which mortality due to RTA is fairly high (Kar *et al.*, 2015).

2.9 Increasing Vehicles cause Road Accidents

China continuing to witness unprecedented, large-scale economic growth and development, accompanied by extensive expansion of road network, which is one of the highest annual motorisation groth rates in the world and incresing the amount of novice drivers (Pendyala and Kitamura, 2007., Senserrick *et al.*, 2011., He *et al.*, 2013).

Attention must be given to dealing with the consequences of economy development and transition from a nation of bicycle riders and pedestrian to one where car ownership desired for autonomy and status (Xu, 2007). Highly increasing of vehicles has brought an additional burden to China. Large numbers of high velocity, motorised vehicles such as trucks, buses, cars and motorcycles sharing the road with a high proportion of vulnerable road users which are the low velocity and non-motorised road users such as cyclists and pedestrian caused serious consequences.

In China, road fatalities are in the lead cause of injury deaths in China overcome natural disasters for example fire, earthquake and flood (Pendyala and Kitamura, 2007., Ma *et al.*, 2012). Since 1987, the rate of mortality caused by traffic was escalated by 8 percent in the two decades (Wang *et al.*, 2008). From Chinese police records, 65 225 people were killed in road crashes in 2010 with males contribute 76 percent of all fatalities (WHO,2013).



Source: World economic Forum, 2015

Figure 2.1: Countries with most Vehicle per Person

2.10 High Risk Group

Amongst road-user groups, inexperienced and new young drivers are at greater risk. The According to OECD (2006), although young drivers aged 25 and below comprise only one-tenth of the population of OECD countries, they account for more than a quarter of fatally injured drivers. An additional 13 passenger or other road users die in the same crashes in every 10 young drivers fatalities (Huang and Winston, 2011).

Risk taking behavior and crash involvement among young novice car drivers, especially males, has attracted considerable research attention. Studies show that poor control of impulse, seeking for sensation, low constraint, having problem with attention, low risk awareness, 'showing off' and risk taking predict risky driving (Iversen and Rundmo, 2002., Begg and Langley, 2004., Clarke *et al.*, 2005., Barkley and Cox, 2007., Frank and Lee, 2007., Cestac *et al.*, 2011., Paaver *et al.*, 2013). Fail to anticipate the potential consequences of their risky actions caused the young drivers are more at risk (Kinnear *et al.*, 2013).

Young driver having a smaller safety margin than they believe which is resulted from underestimate the complexity of the driving task, overestimate their current capability, or both (Fuller, 2005; 2011).

In Malaysia, Malays are the most vulnerable road users as stated by the number of deaths from car and motocycles crashes as well as number of pedestrian killed. Male Malay youths aged between 16 to 25 contributed to more apparent road deaths in rural

areas and have been considered as the most vulnerable group of road users in Malaysia compared to any other demographic groups (MROADS, 2010).

The group which is generally made up of less educated and low income is more exposed to motorcycle crashes along the state or federal roads in rural areas in Malaysia. According to MROADS (2010), number of fatalities involving young Malays male aged between 15 to 25 was 853 which is contribute to 12.41 percent of the total deaths from road crashes in Malaysia in 2010. Based on 2012 statistics on road deaths among ethnic Malay for cars, motocycles and pedestrians were 686, 2427 and 170 respectively.

2.11 Impact of Road Traffic Accidents on Elderly

RTIs become a serious public health problem worldwide. More than 1.2 million people are killed due to road traffic injuries globally while 50 million others are injured each year. Low and middle income countries contribute to more than 90 percent of RTI death (Paden *et al.*, 2004., WHO, 2009). The elderly use healthcare facilities medical and traumatic illnesses. The aging population cause the increasing in the total number of older road users, either as vehicle occupants or as pedestrians.

Older drivers have a major impact on other road users because of increasing the risk of morbidity and mortality of their passengers and other passenger vehicles' occupants. Physiological functions, for example vision and reaction time which is decline because increasing age and cognitive functions also may decrease that prone older adults to fragility. Increased fragility caused elderly collision victims have an increased risk of fatality, due to age-related declines in physical and mental health (Yee *et al.*, 2006.,

Fairfax *et al.*, 2015). In Europian Union, elderly people are involved in 40 percent of fatal traffic injuries.

In several European countries, pedestrians aged 65 years and older which representing only 15 percent of the total population, accounted for 45 percent of all pedestrian fatalities that had been proven by a report from the OECD. Besides that, many studies showed high mortality and morbidity in old ages in comparison to young people even in equal severity of crashes (Etehad *et al.*, 2015).

This difference can be described by physical and mental impairments associated with aging. Older drivers in some countries are imposing medical screening and drivingskill tests at re-licensing for adapting this aging group with the changes of their functional (Langford *et al.*, 2004., Siren and Meng, 2012., Tay, 2012).

2.12 Road Accidents Prevention

Road traffic deaths and serious injuries are preventable because the risk of incurring injury in a crash is predicted. Many countermeasures to prevent the road traffic deaths and serious injuries are effectively proven. The countermeasures are including planning and design road traffic system that affordable means of travel, prevent pedestrians and cyclist from accessing motorways and vice versa to reduce contact between high speed traffic and unprotected roa users, higher occupancy vehicle given priority in the road network and taking into account road safety for road design during planning stage.

Exposure to road injury risk can be reduced by many ways such as reduce the volume of motor vehicle traffic by means of better land us, provide efficient network with shortest or quickest routes that have safest route, encourage drivers to change from higher risk modes of transport to lower risk and restrictions on the road infrastructure, on motor vehicle users or on the vehicles.

Among the major road safety worldwide are collisions between vehicles leaving the road and roadside objects such as trees, poles and road signs. Hence, protective roadside having certain provisions need to be designed. The provisions are including design roads with no dangerous roadside objects, introduce a clear zone at the side of the road, roadside objects must be protected with barriers to absorb part of impact of energy and create better vehicle design to protect vehicle occupants from impact of collision with roadside objects.

Besides that, good enforcement is an integral part of road safety. Example of good enforcement are including setting speed of the road closely associated with road function and road design and enforce automatic speed enforcement such as by using speed cameras. Besides that, it is necessary to set speed limits in heavy goods and public tranport vehicles.

Enforcement levels must be high and maintained over a period of time to ensure the risk of being caught of traffic rules remains high. When the offenders are caught, their penalties should be dealt efficiently. To improve effectiveness of enforcement, use selective enforcement strategies to target particular risk behaviors and choosing specific location (Deshpande, 2014).

CHAPTER 3

METHODOLOGY

3.1 Study Design

The study on factors that lead to road accidents among students were non-experimental research and quantitative method where involved a survey research design. Survey research designs use a questionnaire to obtain the required information from the study sample. Questionnaires are the primary method of collecting quantitative data. Questionnaires is used by researchers to collect the data in specific time in survey research (Mohd Najib, 1998). According to Meor and Nurul (2011), the most effective way to get the information about the variables is by the used of suitable questionnaires. Information gained from the questionnaires is more valid because the validity of the information obtained is much higher compared to the other methods. The questionnaires will help and facilitate the respondents to choose the answer that is already available.

Questionnaires was used and selected as a method to obtain the information because this is the easier method to get the information on the aspect of the study and to get feedback from the respondents. All the information can be collected directly from the respondents in a short time. Besides that, the questionnaires used for this study can save time, cost and manpower. The response given by the respondents was coded and recorded.

The used of questionnaires as an instrument in research provide many adventages in colleting the data. The advantages are including the fear and shame that arise from direct contact can be avoided and inexpensive to manage comapred to the interview.

Besides that, the advantage of survey research are respodents are free to answer within their time and ensure confidentiality of the questionnaires and it can create more honest respond compared with the information obtain from interview and lastly questionnaires are a method to get the information (Aziz, 2003).

The questionnaires on factors that lead to road accidents was developed based on objectives of the study and it was used to identify the demographic data, attitude and behavior of the respondents and also determine the relationship between them. The questionnaire consisted of three sections, which are Section A is a respondent demographic data, Section B is a questions related to bahavior of drivers and Section C is related to attitude of drivers.

3.2 Study Location

This study conducted in Health Campus Universiti Sains Malaysia (USM) located in Kubang Kerian, Kelantan. There are 11 programmed in School of Health Sciences (PPSK). The programmed involved in this study are Environmental and Occupational Health, Audiology, Nutrition, Dietetic, Science Forensic, Diploma Nursing, Degree Nursing, Biomedicine, Sport Science, Medical Radiation and Speech Pathology.

3.3 Population of Study

This study was conducted among undergraduate final year students of School of Health Sciences in Health Campus Universiti Sains Malaysia. The sample populations were selected based on inclusive and exclusive criteria.

3.4 Sample Collection

The sample size in this research referred to the undergraduate students at Universiti Sains Malaysia. The sample size was determined by using the Krejcie and Morgan (1970) table for determining sample size. The total of undergraduate students at Universiti Sains Malaysia are 274. So according to Table 3.1, the sample size should be 162.

TABLE FOR DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size
"S" is sample size

Krejcie, Robert V., Morgan, Daryle W., "Determining Sample Size for Research Activities", Educational and Psychological Measurement, 1970.

Source: Krejcie and Morgan's (1970)

Figure 3.1: Krejcie and Morgan's sample size table

The inclusive and exclusive criteria for the selection of respondents were listed below:

Inclusion Criteria:

1. Respondents in this study are students from Universiti Sains Malaysia.
2. Respondents should have driving experience.
3. Respondents are final year undergraduate students of PPSK.
4. Respondents are full time students.
5. Respondents must understand either bahasa Malaysia or English.
6. The participants involve are those who agree to participate in this research and signed the informed consent.

Exclusion Criteria

1. Participants who are not from Universiti Sains Malaysia are excluded from this study.
2. Participants that have inclusive criteria but not willing to participate or refused to continue participation or want to drop out in this study due to personal reasons or illness should be excluded.

3.5 Instrument and Materials

The instrument for data collection was structured questionnaires developed by the researcher and validation by Pusat Bahasa dan Literasi Universiti Sains Malaysia. The questionnaires was divided into three section which were Section A, Section B and Section C. Section A was questions on demographic data, Section B for behavior of driver and Section C for Attitude of driver. A 5-point Likert-type scale with possible